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(54) Removing ash from stock suspension

(57) Ash is removed from fibrous stock suspensions when processing waste-paper, in particular following a flotation process carried out to remove printing inks with the aid of chemicals by separating the stock suspension in a sorting strainer, the ash and a short-fibre portion passing through the strainer, after which separation into ash and fibres which can be used again is effected, while the pulp stock remaining in front of the sorting strainer is conducted away for further processing.

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Fig. 1

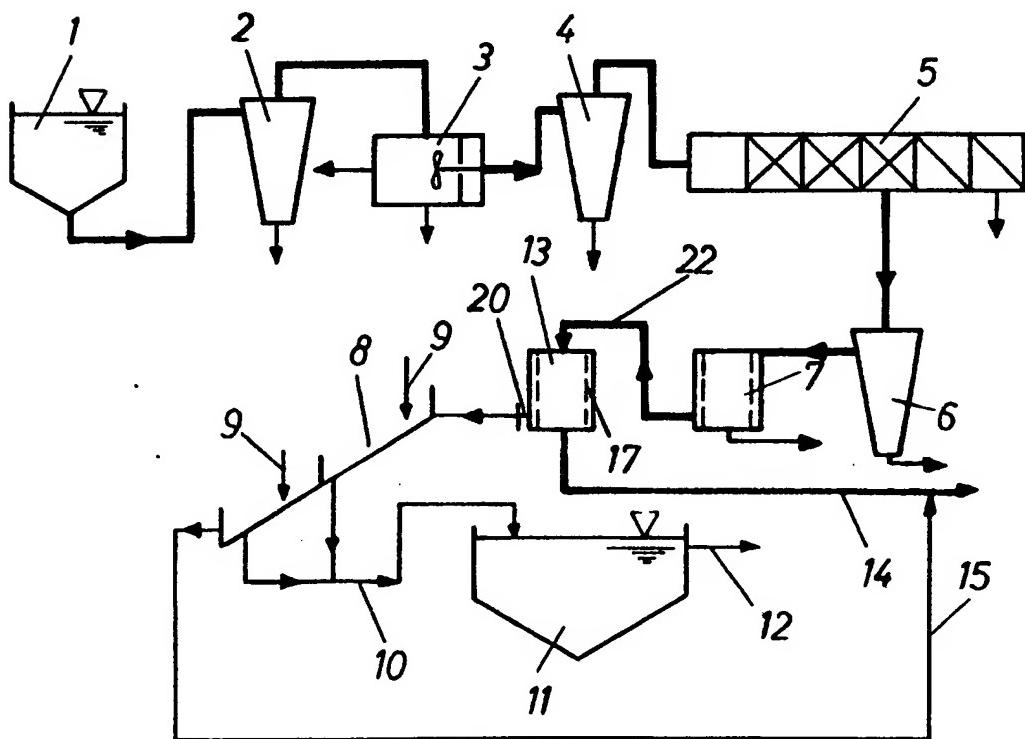
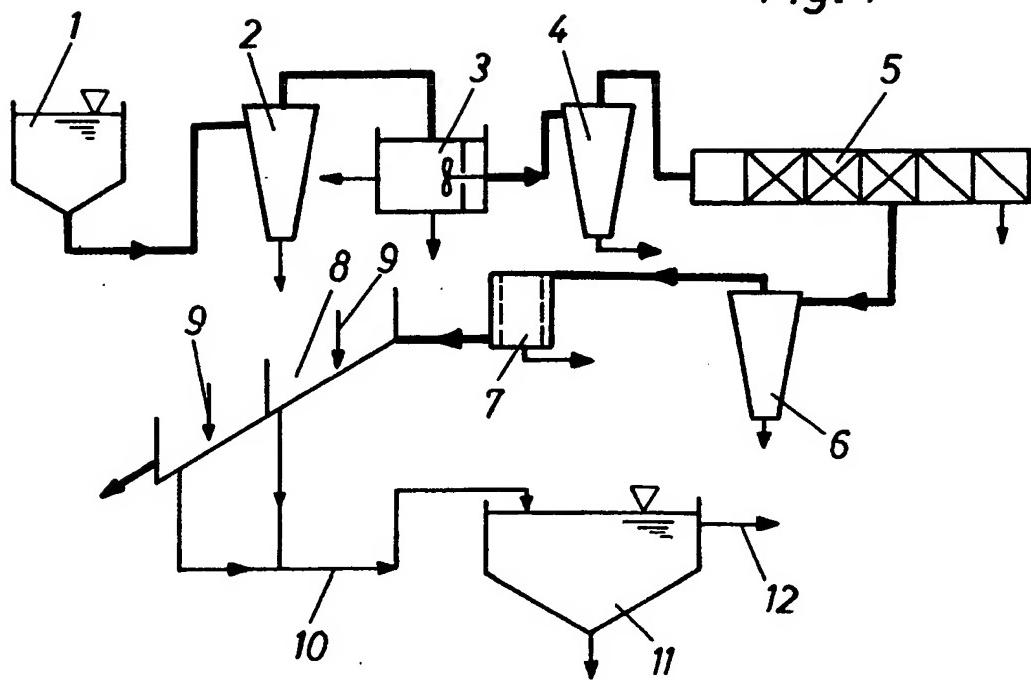
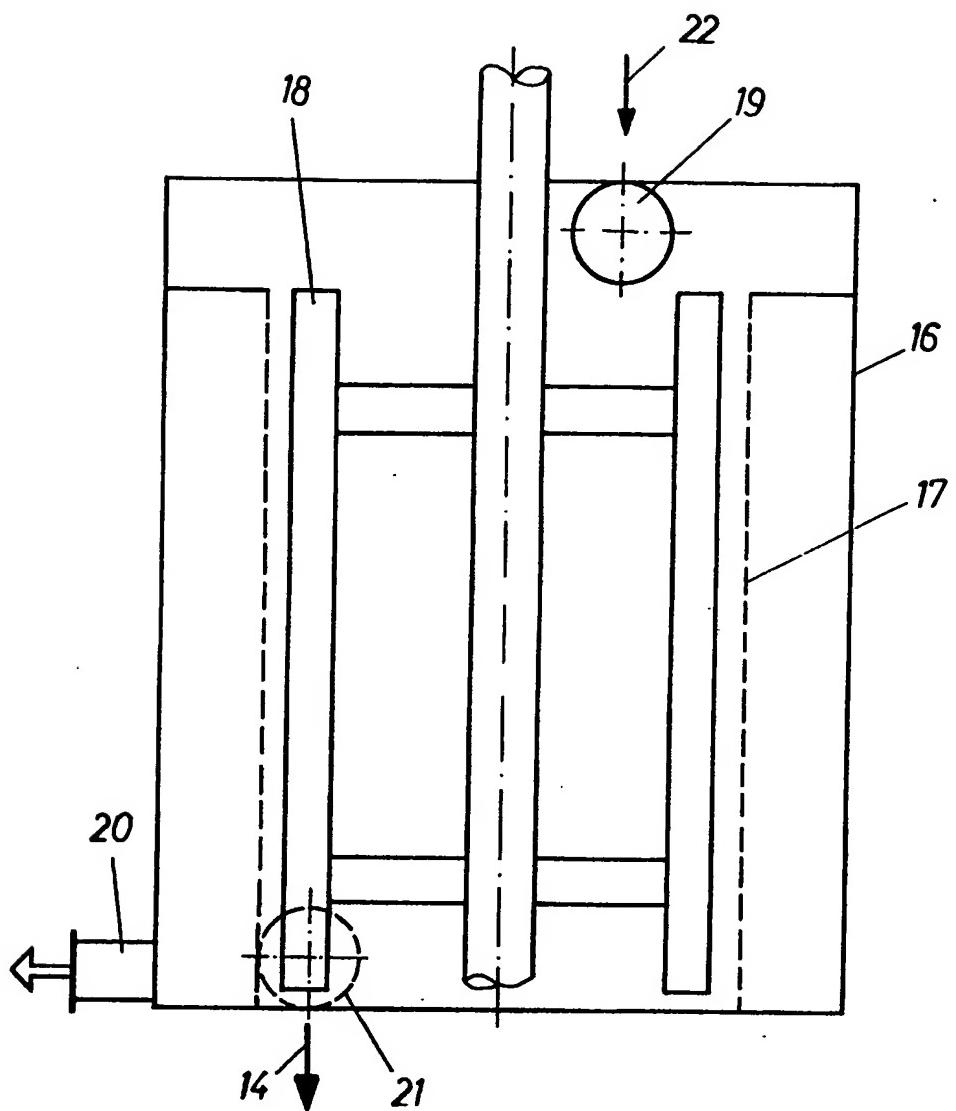


Fig. 2

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Sheet 2.



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Fig. 3

SPECIFICATION**A process and apparatus for removing ash from fibrous stock suspensions in the processing of waste-paper**

The invention relates to a process and apparatus for removing ash from fibrous stock suspensions when processing waste-paper, in particular following a flotation process carried out to remove printing inks with the aid of chemicals, by means of a separation process with subsequent clarification of the ash-laden water. For the production of certain types of paper, such as hygiene papers based on waste-paper, a pulp is required which is as low as possible in ash. The processing of the paper is effected in this instance, for example, by pulping, sorting and flotation to remove printing inks (see German Patent Specification No. 2 610 581). Amongst others, the chemicals used for this purpose are generally sodium hydroxide (NaOH), hydrogen peroxide (H_2O_2) or sodium peroxide (Na_2O_2), water-glass ($\text{Na}_2 + 1.7 \text{ SiO}_2$), saponified fatty acid mixtures and/or the like.

However, ash (particles of filler) in particular, but also fragments of fibre, fine pulp, etc. are not eliminated to an adequate extent during the flotation process. The procedures known until now therefore include an ash-removing process of the type where all of the pulp which is to be processed is subjected to a separation process by straining, filtering or sedimentation. The very considerable quantities of water which result from the ash-removing process also necessitate a clarification station for the waste water, to remove the ash, fibre fragments and fine pulp contained in it, and to return the clarified water to the process.

In German Patent Specification No. 2 610 581 a method of re-processing waste-paper is described in which the ash (particles of filler) is separated out after a flotation process, by rinsing it out in a washing appliance. The water resulting from this is then cleansed in a sedimentation plant.

However, a disadvantage of this process is that the plant required for it represents a considerable investment. In addition, it requires a great deal of space and energy. The yielding of large amounts of washing water also calls for expensive clarifying equipment.

An object of the present invention is to provide a process and apparatus for removing ash from fibrous stock suspensions in the processing of waste-paper, which make the processing of waste-paper more economical.

According to one aspect of the invention, in the process for removing fibrous stock suspensions when processing waste paper, the fibrous stock suspension is subjected to a sorting process via a strainer with a suitable hole-size, the ash and a short-fibre portion passing through the strainer, after which, in a known way, separation into ash and fibres which can be used again is effected, while the pulp stock remaining in front of the sorting strainer is conducted away for further processing.

Thus, in accordance with the invention, all the pulp

is now separated before the ash-removing appliance into a portion which is low in ash and a portion which is rich in ash. The portion which is low in ash, which may amount to 80%, for example, with an appropriate choice of hole-size for the strainer, can therefore be supplied to the next processing stage without further treatment. Only a considerably smaller amount, corresponding to 20%, for instance, has to be de-ashed in an appropriate separating process.

The main advantage of the process according to the invention consists in the fact that the plant required now for the de-ashing can have substantially smaller dimensions, which means that the financial viability of the ash-removing equipment is increased by reduced investment, space and energy costs. The cost of the additional provision of a suitable sorting device are small by comparison. A further increase in the financial viability is afforded by the reduction in the yield of washing water which is also obtained in this case. The clarification of the water is thus simplified, and cheaper.

Sorting for the ash-removing process can be carried out in this instance following a flotation process. Naturally, it may be carried out at another point, or its use with another process in which no flotation plant is used is also possible.

As a further development of the process, provision is made for the separation of the ash-laden water and the recovery of the fibres which can be used again to be effected in a washing appliance.

An advantageous embodiment of the invention process consists in carrying out the sorting process using a strainer with approximately 0.6 - 1.2 mm diameter holes, or with an equivalent slit width. Very good results are obtained with these values, a hole-diameter of 1 mm apparently being the most suitable in the majority of cases.

In the process of the invention, provision is also made for the separation into ash and fibres which can be used again to be carried out using a strainer with a mesh width of approximately 0.3 mm.

Apparatus for carrying out the process according to the invention includes the provision of a pressure-sorter which is known per se for the sorting process, with a strainer basket which the substance flows through from the inside to the outside, the extraction line for the ash-laden portion being disposed behind the strainer on the peripheral wall, and the outlet for the pulp stock being disposed on one end wall of the pressure sorter.

A construction example of the invention is described in more detail in the following, with reference to the accompanying drawings, in which :-

Figure 1 is a block diagram of an ash-removing process as in the state of the art.

Figure 2 is a block diagram of the ash removing process according to the invention.

Figure 3 is a sorter for the ash-removing process. According to *Figure 1*, in which the flow of stock is shown only schematically, the pulping of the waste-paper is carried out in pulper 1, from which the pulp is conducted to a flotation plant 5 via a hydrocyclone 2, a lump-removing and sorting appliance 3 and a further hydrocyclone 4. After the flotation appliance 125 the stock is cleansed and sorted again in a hydrocy-

clone 6 and a pressure-sorter 7, before all the stock arrives in a two-stage washing appliance 8 for the ash-removing process. Washing water is supplied via lines 9. The ash-laden water is conducted into a settling tank 11 via a line 10. The cleansed water is extracted from this tank via a line 12, and is fed into the process again.

A plant according to the invention is described schematically in Figure 2. The pulp processing, 10 cleansing, sorting and flotation are carried out in this instance in the same way as in the state of the art, as shown in Figure 1 as far as the pressure-sorter 7. Now, however, after the pressure-sorter 7 the suspension is supplied to a sorting appliance 13 for 15 separating it into a portion which is low in ash and a portion which is rich in ash. Fragments of fibre, ash and fine pulp pass through the fine-gauge holes or slits in the strainer and are washed out on the following washing device 8 with washing water 20 supplied via the lines 9. The ash-laden washing water is supplied via a line 10 to a settling tank 11 in the same way, from whence the cleansed water is also returned again via a line 12 to the process. The fibrous stock suspension itself which does not pass 25 through the strainer of the sorter 13, due to the width of the holes or slits, is conducted away via the line 14. The fibres held back on the washing device 8 are also fed back via a line 15 into the pulp stock line 14.

Instead of a settling tank, other separating equipment may also be used for the clarification of the 30 ash-laden water.

The sorting appliance 13 is shown in more detail in Figure 3. It consists of a vertically-disposed cylindrical housing 16, in which a strainer basket 17 is 35 arranged stationary and coaxially. The inner face of the strainer basket is swept by rotating paddles 18, so that the strainer is kept free from foreign bodies and tangles. The suspension which is to be despashed arrives in the housing 16 via an aperture 19.

40 The strainer has a hole width of 1 mm, or an equivalent slit width. This means that ash, fragments of fibre, fine pulp and the like can pass through the strainer and are removed from the housing 16 via the extraction line 20. The fibrous stock suspension 45 in front of the strainer is removed from the sorter via a pulp stock outlet 21 and is conducted on via the line 14.

CLAIMS

- 50 1. A process for removing the ash from fibrous stock suspensions when processing waste-paper, in particular following a flotation process carried out to remove printing inks with the aid of chemicals, by 55 means of a separation process with subsequent clarification of the ash-laden water, characterised in that the fibrous stock suspension is subjected to a sorting process via a sorting strainer with a suitable hole or slit size, the ash and a short-fibre portion 60 passing through the strainer, after which, in a known way, separation into ash and fibres which can be used again is effected, while the pulp stock remaining in front of the sorting strainer is conducted away for further processing.
- 65 2. A process according to Claim 1, characterised

In that the separation into ash-laden water and fibres which can be used again is effected in a washing appliance.

3. A process according to Claim 1 or 2, characterised in that the sorting process is carried out using a strainer with approximately 0.6 - 1.2 mm diameter holes, or with an equivalent slit width.
4. A process according to Claim 1, 2 or 3, characterised in that the separation into ash and 75 fibres which can be used again is carried out using a strainer with a mesh width of approximately 0.3 mm.
5. Apparatus for carrying out the process according to Claim 1, characterised in that a pressure-sorter which is known per se and has a strainer basket 80 through which the substance flows from the inside to the outside is provided for the sorting process, the extraction line for the ash-laden portion being disposed behind the strainer on the peripheral wall of the housing, and the outlet for the pulp stock 85 being disposed on one end wall.
6. A process for removing the ash from fibrous stock suspensions when processing waste-paper substantially as hereinbefore described with reference to Figures 2 and 3 of the accompanying drawings.
7. Apparatus for removing the ash from fibrous stock suspensions when processing waste-paper constructed, arranged and adapted to operate substantially as hereinbefore described with reference to 95 Figures 2 and 3 of the accompanying drawings.
- New claims or amendments to claims filed on 21 Nov. 1979
Superseded claim 5
- 100 New or amended claim:-
5. Apparatus for removing the ash from fibrous stock suspensions when processing waste paper in accordance with the process of Claim 1, characterised in that a pressure-sorter, which is known per se, is provided for the sorting process, having a sorting strainer basket with a suitable hole or slit size through which the suspension flows from the inside to the outside of the basket, an extraction line for the ash-laden portion of the suspension is disposed 105 behind the strainer on the peripheral wall of the housing, and an outlet for conducting away the pulp stock for further processing is disposed in front of the strainer, on one end wall thereof.